

What is claimed:

1. A method of evaluating a diffracting structure formed on a semiconductor sample comprising the steps of:

5           creating a database, said database including interpolation points and associated theoretical optical response characteristics, each interpolation point corresponding to a sample parameter set and with the associated theoretical optical response characteristics being determined by applying a sample model to each of the parameter sets;

          measuring the actual optical response characteristics of the sample; and

10           iteratively interpolating between the interpolation points using an interpolation model that defines a substantially continuous function which intersects with the interpolation points in order to derive a set of interpolated optical response characteristics that best fit the actual optical response characteristics to evaluate the sample.

15           2. A method as recited in claim 1, wherein the optical response characteristics are in the form of one or both of complex reflectance coefficients and scattering matrices.

20           3. A method as recited in claim 1, wherein said optical response characteristics are created and measured as a function of wavelength.

          4. A method as recited in claim 1, wherein said interpolation model utilizes one or more of linear, multi-cubic, and quadratic functions.

25           5. A method of evaluating parameters of a diffracting structure formed on semiconductor samples comprising the steps of:

          calculating optical response characteristics for selected parameter sets, each set of parameters corresponding to an interpolation point;

30           defining a continuous model of the optical responses as a function of the parameters that equals the optical responses at the interpolation points;

          measuring an optical signal of a sample; and

evaluating the parameters of the sample by iteratively fitting the optical signal with the interpolation model.

5        6.        A method as recited in claim 5, wherein the calculating comprises calculating one or both the complex reflectance coefficients and scattering matrices.

7.        A method as recited in claim 5, wherein said optical signals are measured as a function of wavelength.

10       8.        A method as recited in claim 5, wherein said measuring step comprises measuring reflectance of the sample.

9.        A method as recited in claim 5, wherein said interpolation model comprises one or more of linear, multi-cubic, or quadratic functions.

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10.       A method as recited in claim 5, wherein fitting comprises calculating a theoretical optical signal from the model.